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American species listed by Brotherus and Paris Index are not cited: *P. acutiflora* Kindb., Victoria, Vancouver Island; *P. amblyoblata* (C. M.) Jaeg., Mexico; *P. Bernoullii* (C. M.) Par., Guatemala; *P. Berteroana* (C. M.) Besch., Trinidad; *P. glabriuscula* Kindb., Canada; *P. graminicola* (C. M.) Jaeg., Mexico; *P. Hansenii* (C. M.) Par., Jamaica, Kingston; *P. ligulata* (C. M.) Par., Porto Rico; *P. pumila* Kindb., Canada; *P. salvadorica* C. M., Honduras; *P. subsphaerocarpa* Broth., Martinique.

Monsieur Dismier states that *P. calcarea* has not yet been found in North America and all the specimens, so-called, are referable to *P. fontana*, but in a recent letter he decided that a specimen from the Mitten Herbarium collected by Lieber in Martinique appears to be correctly so named. He also says that he feels greatly the deficiencies of the Revision and proposes to continue his studies. He has established the fact that two species from the southern United States range through the West Indies to South America, but one point in nomenclature which hinges on this distribution, Monsieur Dismier has failed to grasp, and that is, that *Bartramia glaucescens* Hsch. (1840) antedates *B. tenella* C. M. (1849) and that it should therefore be known as *P. glaucescens* (Hsch.) Paris. He also has failed to take up another older specific name, for *B. longiseta* (Michx. flor. bor. Am. 2: 301. 1803) antedates *B. radicalis* P. B. (1805) and it should therefore become **Philonotis longiseta** (Michx.) E. G. B. new comb.

New York Botanical Garden.

REVISION OF THE AMERICAN SPECIES OF PHILONOTIS.

G. DISMIER.

Translation by E. B. Chamberlain.

[In the following translation of M. Dismier's Revision des *Philonotis* de l'Amérique I have limited myself to those species and varieties which are found in the United States and Canada, save that the Key to the Species is given in full. On account of the difficulty of obtaining descriptions of the species in the sense adopted by M. Dismier, I have added short descriptive notes for nearly all the species, as well as references to plates and a few additional synonyms. In each case the source of this description is given, in nearly all cases M. Dismier's "Essai Monographique sur les *Philonotis* de France," published in the Mémoires de la Société nationale des Sciences naturelles et mathématiques de Cherbourg, Vol. 36, pages 367 to 428. (1908).

I wish to express my thanks to Mrs. E. G. Britton, Rev. H. Dupret, and especially to M. Dismier for the kind assistance that has been given me in this work.—E. B. C.]

KEY TO THE AMERICAN SPECIES OF PHILONOTIS.

Leaves not margined.

Dioicous or autoicous, male flowers gemmiform... *Philonotula*.

Dioicous, male flowers discoid.

Leaf-cells uniformly quadrate, with papillae over the center of the lumen... *Catenularia*.

Leaf-cells elongated, with papillae at the end of the lumen... *Eu-Philonotis*.

Leaves margined... *Pseudo-Mniobryum*.

Section I.—PHILONOTULA. *Bry. Eur. fas. 12: 21. (1842)*, as subgenus of *Bartramia*.

Autoicous species.

Plant 2-3 cm. high, usually without subverticillate branches below inflorescence; seta 3-4 cm., long; North American... *P. radicalis*.

Plant not over 2 cm high, with 4-5 subverticillate branches below inflorescence; seta short; South American... *P. curvata*.

Dioicous species.

Leaves obtuse; costa ceasing below apex... *P. gracillima*.

Leaves acute.

Plants small.

2-3 cm. high; leaves rather broad... *P. sphaerocarpa*.

1-2 cm. high, leaves narrow... *P. tenella*.

Stems stiff; leaves closely appressed when dry... *P. rufiflora*.

Stems slender, leaves in regular rows; innovations numerous, filiform; capsules small... *P. elegantula*.

Leaves secund; capsules small... *P. Moritziana*.

Leaves shining, patent, distant... *P. chrysoblata*.

Plants rather tall.

Stems hooked at the summit; leaves secund, closely set; costa not very strong... *P. uncinata*.

Stems flexuous; leaves more distant; costa very strong... *P. crassinervia*.

Section II.—CATENULARIA Muell., *Flora*. 1885. 411. as section of *Bartramia*... *P. scabrifolia*.

Section III.—EU-PHILONOTIS Limpr., *Laubm.* 2: 557. (1893).

North American species.

Leaves sharply toothed all around; papillae over upper end of lumen.

Plants 1-2 cm. high: stem leaves oblong lanceolate, plane or slightly concave... *P. capillaris*.

Plants 3 cm. high; stem leaves long triangular, slightly concave and carinate... *P. marchica*.

Leaves with paired teeth, at least at base; papillae over the lower portion of the lumen, or sometimes over the middle.

Leaves in regular rows.

Rows spiral; leaves obtuse, costa very stout, red-papillate.....*P. seriata*.

Rows not spiral; stem-leaves acute, very concave; costa more or less excurrent.....*P. americana*.

Leaves not in regular rows.

Leaves wholly plane.....*P. caespitosa*.

Leaves revolute.

Plants of medium height.

Stems slender; stem leaves erect, patent at tip, oblong lanceolate, revolute nearly to apex; costa slender, long piliform-excurrent.....*P. tomentella*.

Stems stouter; stem leaves falcate-secund, narrowly lanceolate, revolute to middle, very long acuminate; costa slender, excurrent.....*P. fallax*.

Plants large, stem leaves plicate at base, broadly oblong, acuminate; costa strong, more or less excurrent.....*P. fontana*.

South American species.

Stems easily separating, simple; leaves secund, oblong; costa mucronate-excurrent.....*P. parallela*.

Stems coherent.

Costa stout, percurrent.....*P. pellucidiretis*.

Costa medium size, more or less excurrent.

Leaves oblong lanceolate, concave, plicate, long acuminate.....*P. fontanella*.

Leaves narrowly lanceolate, plane, not plicate; costa mucronate-excurrent.....*P. elegantissima*.

Section IV.—PSEUDO-MNIOBRYUM. Broth., *Natuer. Pflanzenf.* I.3: 652. (1904).....*P. vagans*.

1. PHILONOTIS RADICALIS (Beauv.) Brid., *Bryol. Univ.* **2**: 17. (1827).

Bartramia radicalis Beauv., *Prodr.* 44. (1805).

Lesq. & James, *Manual.* 206. (1884).

Sulliv., *Icones Musc.* 85. t. 52. (1864).

Ph. orizabana. Schimp. mss. Besch., *Prodr. Bryol. Mex.* 58. (1871).

A species of the eastern coast of the United States and Mexico*; ranging from New York to the Gulf, west to Kansas.

*Brotherus, in *Natuer. Pflanzenf.* I.3: 646, reports this species from Corea.

2. PHILONOTIS GRACILLIMA Aongstr., *Oefv. Kgl. Vet.-Akaa Foerh.* **33**: 17. (1876).

Tufts small, stems slender; leaves erecto-patent, oblong lanceolate, nearly plane, obtusely serrulate, obtuse, with lax, hyaline areolation; costa ceasing below the apex. (*Aongstr. l. c.*)

Range: Southwest Texas: Jamaica and the lesser Antilles to Bolivia and Brazil.

3. PHILONOTIS SPHAEROCARPA (Swartz) Brid., *Bryol. Univ.* **2**: 25. (1827).

Mnium sphaerocarpum Swartz, *Prodr.* 139. (1788); Hedw., *Musc. Frond.* **3**: 93.t.38, A. (1792).

Bryum sphaerocarpum Swartz, *Fl. Ind. occ.* **3**: 1835. (1806).

Stems erect, tomentose; fasciculately branched; leaves imbricate, patent, lanceolate-acuminate, cuspidate, denticulate, with lax, quadrate areolation, papillose on the back; capsule long-pedicelled, globose.—(*Muell., Syn. Musc.* **1**: 481.)

Range:—South Florida: West Indies and Central America to Brazil and Peru.

4. *PHILONOTIS TENELLA (Muell.) Jaeg. *Adumb.* **1**: 541. (1873-4).

Ph. Muehlenbergii var. *tenella* Brid., *Bryol. Univ.* **2**: 23. (1827).

Lesq. & James, *Manual.* 208. (1884.)

Bartramia tenella C. Muell., *Syn. Musc.* **1**: 481. (1849.)

Bartramia glaucescens Hornsch., *Fl. Brasil.* **1**: 40. (1840).

Philonotis glaucescens (Hsch.) Paris, *Ind. Bryol.* Ed. 1. 923. (1885). (*)

Very small, tomentose, with recurved branches near the apex of the stems; leaves densely arranged, lanceolate, subsecund, acutish, obscurely denticulate, remotely papillose on the back; areolation minute and lax; capsule long-pedicelled, more oblong than in *Ph. sphaerocarpa*.—(*C. Muell., l. c.*)

Range:—Southern Louisiana; throughout the Antilles and Central America to Brazil and Chile.

var. TERRESTRIS Dismier.

In dense turfs, stems very short (3-5 mm.)

Range:—South Florida, Porto Rico, Guadeloupe, Brazil, Paraguay.

5. PHILONOTIS MARCHICA (Willd.) Brid., *Bryol. Univ.* **2**: 23. (1827).

Bartramia marchica Brid., *Mant. Musc.* 116. (1819).

Bry. Eur. Monog. 17, t.8. (1842).

B. Muehlenbergii Schwaegr., *Supp. I.* **2**. 58. t.61. (1816).

Philonotis Muehlenbergii (Schwaegr.) Brid., *l. c.* 22.

Lesq. & James, *Manual.* 208. (1884).

A species that is often confused with others of the genus, yet readily separated by the following characters:—Leaves shaped like

*For more extended synonymy, see the original article.

an elongate isosceles triangle with curved borders, carinate; teeth acute, never in pairs; papillae always over the upper end of the cells. Range:—New Brunswick and Ontario, south to Texas, west to Minnesota.

6. PHILONOTIS SERIATA (Mitt.) Lindb., *Musc. Scand.* 15. (1879).

Dixon & Jameson, *Handbook*. Ed.ii: 324. t. 41. B. (1904).

Bartramia seriata Mitt., *Musci Indiae orient.* 63. (1859.)

Tufts loose; stem leaves in *regular spiral rows*, oval-lanceolate, falcate, acuminate, obtuse, carinate, somewhat decurrent, concave and plicate, marginal teeth in pairs; costa strong, *red, highly papillose at back*; perigonal leaves, oval, *rounded at apex, obscurely costate*.—(*Essai*, 417.)

A rare species in America, the only specimens seen coming from Greenland. Most specimens so named are referable to the next subspecies.

7. *PHILONOTIS AMERICANA Dismier.

Ph. fontana varr. *serrata et brachyphylla* Kindb., *Catl. Canadian Pl.* Pt. 6: 107. (1892), (*nom. nud.*)

Dioicous; in more or less dense cushions, yellowish green or rarely deep green, interwoven with brown tomentum below; stems 6-7 cm. high. Stem leaves 2.5×0.9 mm., appressed and arranged in regular rows, *oval or oblong-oval*, rather shortly acuminate, very concave, carinate, with 1-2 plicae on each side of the costa; margins revolute below, the teeth in pairs even in the upper portion; costa well developed, yellowish, orange, or brown, at times papillose on the back, usually somewhat excurrent; areolation of the rectangular cells laxer toward the base with papillae at the lower angles. Male inflorescence large; perigonal bracts erecto-patent, or horizontal, oval, strongly concave, rounded or acute at apex, costa obscure. Seta 4 cm. long, dark red, flexuose. Capsule oval-arctuate, 3×2 mm., brown, strongly sulcate when dry; operculum conical, obtuse; stomata numerous in the collum. Teeth of peristome brown, lanceolate, 0.4×0.08 mm., of about 25 articulations, with *tori* in the upper third. Endostome yellowish, papillose, basal membrane 0.18 mm. high with the processes equalling the teeth, open along the keel, cilia 3. Spores 20μ in diameter, globose or reniform, yellowish, verrucose.

Range:—Aleutian Islands, British Columbia and Newfoundland, south to Utah, Wisconsin and New York.

var. TORQUATA (Ren. & Geh.) Dismier.

Ph. Macounii var. *torquata* Ren. & Geh., *Rev. Bry.* **23**: 61. (1896).

Leaves large, spirally twisted when dry, very concave and deeply plicate near the nerve.—Washington. — (*Rev. Bry. l. c.*)

var. GRACILESCENS Dismier.

Tufts dense, green, with long slender stems, and small short leaves.
Gaspé Co., Quebec.

An extremely variable species, especially in gross appearance. The leaves may be short and abruptly acuminate, or oblong-lanceolate and gradually acuminate with a long excurrent costa. While approaching *Ph. seriata* the present species differs in the arrangement of the leaves and the shape of their apex. *Ph. glabriuscula* Kindb., *Catl. Canadian Pl.* Pt. 6: 107, belongs here according to some examples of No. 578, *Canadian Musci*, but specimens from the original locality distributed by Mr. J. Moser are *Ph. caespitosa*.

8. PHILONOTIS FONTANA Brid., *Bryol. Univ.* **2**: 18. (1827).

Lesq. & James, *Manual*. 209. (1884).

Dixon & Jameson, *Handbook*. Ed. 2: 321. t. 40. J.
(1904). (excl. var.)

Bartramia fontana Brid., *Mant. musc.* 116. (1819).

Bry. Eur. Monog. 18, t. 9. (1842).

In dense tufts, stems erect, with subverticillate branches; stem leaves erect, more or less imbricate, slightly secund, concave, *oval or cordiform-lanceolate*, slenderly acuminate, *strongly revolute to middle*, 1-2 plicate, *teeth of margin in pairs*; *costa strong, broader at the base*, more or less excurrent; areolation rectangular or rhomboidal, papillae in the lower angles; perigonal leaves oval triangular, *the inner obtuse*.—(*Essai*. 403.)

Range:—Throughout North America, extending into Mexico.

Polymorphous: like many mosses of similar habitat. The specimens in Sull. & Lesq. *Musci Boreali-Americani* Nos. 165 & 250, distributed as *Ph. calcarea*, are without any doubt *Ph. fontana*. Up to the present no specimens of *Ph. calcarea* are known from America.

var. HETEROPHYLLA Card & Thér. *Univ. Cal. Publ. (Bot.)*
2: 300. (1906).

Leaves dimorphous, the lower normal, the upper short, imbricate scarcely revolute, laxly areolate with short cells. Perigonal leaves distinctly costate to apex, obtuse or acute in the same involucre.—(*Card. & Ther.*, l. c.)

Range:—Alaska, Aleutian Islands, Selkirk Mts., Montana, Maine.

9. PHILONOTIS TOMENTELLA Mol. *emend. Loeske, Hedw.* **45**: 203. (1906).

Roth, *Eur. Laubm.* **2**: 239. t. 26 f. (1904).

Ph. alpicola Jur. in sched. Lorentz, *Moosst.* 170. (1864).

Ph. microcarpa Kindb., *Rev. Bryol.* **32**: 37. (1905).

Tufts more or less dense, radiculose; stems erect, 6-10 cm. high, simple or with verticillate branches. *Leaves of two alternating*

forms:—(1). leaves 1.2×0.8 mm, imbricate or patent at the tip, lanceolate, long acuminate, *revolute to apex*, marginal teeth in pairs, *costa slender, long excurrent, with dentate, piliform point*; areolation rectangular, papillae at the lower angles; (2), leaves plane, obtuse, crenulate, the costa *ceasing below the apex, or percurrent, or somewhat excurrent*. Perigonal leaves broadly lanceolate, *gradually acuminate*.—(*Essai*, 410.)

Range:—Alaska, Canada and Greenland, south to California, Colorado and Minnesota, usually at considerable altitudes.

var. BOREALIS. (Hag.) Loeske, *Hedw.* **45**: 206. (1906).

Ph. fontana var. *borealis* Hagen, *Kgl. Norsk. Vidensk. Selsk.* 1888.

Stem but little branched; leaves dimorphous; the upper roundish-oval, crenulate at apex, costa ceasing below apex or sometimes percurrent; the lower leaves oval lanceolate, areolation lax, especially at the base.—(*Essai*, 412.) Range:—Alaska, Montana.

var. COMPACTA (Schimp.) Dismier, *Essai*. 413. (1908).

Ph. fontana var. *compacta* Schimp. *Syn. Musc.* Ed. 2: 220. (1876).

Tufts compact, closely interwoven with radicles, stems very long (15 cm.). Range:—Greenland, Labrador, British Columbia.

var. HETEROPHYLLA Dismier.

Varies from the type in that the stems end in very slender innovations which have the leaves distant, and wholly different in form and structure from those of the main stems. Range:—Selkirk Mts.

A boreal or alpine species which, while readily distinguished when in normal condition, approaches *Ph. fontana* when growing at lower altitudes. The shape and margin of the leaves, and the slender, piliform, excurrent costa give it a very distinct facies under the microscope.

All specimens of *Ph. acutiflora* Kindb., *Hedw.* **35**: 67. (1896),* examined were referable either to *Ph. fontana* or to the present species.

10. PHILONOTIS CAESPITOSA Wils., *in sched. Musc. Brit.* No. 278.

Braithw., *Br. Moss Fl.* **2**: 210. t.77. E. (1893).

Tufts more or less dense, stems 5-7 cm. high, simple or branched, subverticillate; stem leaves, *secund, oval, lanceolate-acuminate, falcate, wholly plane, without plicae*, margin denticulate, the *teeth simple above and in pairs below*: papillae over the upper ends of the upper cells, but in the lower ones over the basal angles. Perigonal leaves very large, concave, *acute, rarely obtuse, with the weak costa vanishing at the apex, or slightly excurrent*.—(*Essai*, 397.)

* M. Dismier refers to this by error as *Ph. acutifolia*, Kindb.

Range:—Canada and Newfoundland to North Carolina, west to Missouri.

var. COMPACTA Dismier.

In compact cushions, the densely foliate stems 4-5 cm. long. Connecticut.

var. LAXA (Warnst.) Loeske & Warnst., *Hedw.* **45**: 104. (1906).
Ph. laxa Warnst., (non Limpr.) *Krypt. Fl. M. Brand.* **2**: 618. (1905).

Ph. fontana var. *ampliretis* Dixon, *Journ. of Bot.* 1902. p. 71.

Laxly tufted; stems 4-5 cm. soft and slender, leaves distant and patent.—(*Essai*, 399.)

Range:—New Brunswick, Conn., N. Y., N. J., D. C.

var. ADPRESSA Dismier, *Rev. Bryol.* **34**: 68. (1897).

Ph. adpressa Limpr., *Laubm.* **2**: 574. (1893), (desc. only).

Stems about 5 cm., laxly coherent, scarcely radiculose, slender, simple, without subverticillate branches, leaves dimorphous,—some like the typical form, others distant, erect, strongly appressed broadly ovate, shortly acuminate.—(*Essai*, 399,)

Range:—N. H., N. J., N. C.

var. HETEROPHYLLA Dismier.

Leaves of two forms:—the lower normal, the upper distant, appressed, short, broader, with strongly chlorophyllose cells.

Range:—Conn., Colo.

A frequent species in America but greatly misunderstood. For certain identification the direction, form and structure of the leaves from the lower portion of a stem, *not* those of the innovations should be studied. The typical leaves are plane, with a thin costa. The lower cells are quadrate and the upper ones elongate rectangular. The species is found exclusively upon a silicious substratum.

11. *PHILONOTIS FALLAX. Dismier.

Dioicous; cushions yellowish to brownish green, interwoven with brownish radicles below. Stems upright, 3-6 cm. high, simple or with verticillate branches beneath the inflorescence. Leaves closely set, second, narrowly oblong-lanceolate, falcate, slenderly acuminate, revolute to the middle, the margins dentate throughout with paired teeth; the costa slender, excurrent into a dentate hair; areolation of rectangular cells, papillae over the lower end. Male inflorescence discoid, surrounded by 6-8 patent bracts which are oval-lanceolate, concave, obtuse, denticulate, gradually narrowed from a concave base, with a thin costa which vanishes below the apex. Seta dark red, erect, flexuose, 5-7 cm. long. Capsule subglobose, with a small, short-conic, acute operculum. Teeth of peristome of medium length; processes of endostome deeply divided, cilia 2-3; spores large, brown, papillose.

Range:—British Columbia to Quebec, south to Idaho, Minnesota, Wisconsin and Maine.

A species that at times approaches *Ph. fontana*, yet well differentiated by the narrow, falcate-secund, acuminate leaves and the slender, excurrent costa. It has been at times confused with *Ph. calcareo*.

12. PHILONOTIS CAPILLARIS Lindb. *Hedw.* 6: 40. (1867).

Dixon and Jameson, *Handbook*. Ed. 2. 325. t. 41.D. (1904.)

Ph. Macounii Lesq. & James, *Manual*. 203. (1884).

Ph. Arnelli Husnot, *Musc. Gall.* 268. (1890).

Ph. Ryani Philib., *Rev. Bryol.* 21: 8. (1894).

Ph. vancouveriensis Kindb., *Eur. & N. Am. Bryin.* 2: 326. (1897).

Ph. media Bryhn, *Kgl. Norsk Vidensk. Selsk. Skr.* 1899. No. 3. p. 39.

Tufts more or less dense; stems slender (0.15 mm), simple or branched, usually without innovations. Leaves erecto-patent, slightly secund, *oblong-lanceolate*, *long acuminate*, 1 x 0.3 mm. without plicae, plane or revolute below, *marginal teeth simple and acute*, either extending to base or in the upper portion only; costa slender, *excurrent and usually piliform-dentate*. Areolation of rectangular cells which are *often in rows parallel to the costa*, papillose above only, papillae over upper ends of the cells. Perigonal leaves oval, gradually acuminate, mucronate or obtuse.—(*Essai*. 392.)

Range :—Alaska, British Columbia, south to California and Idaho; Delaware Water Gap.

Usually upon a silicious substratum.

NOTES ON VERMONT BRYOPHYTES—VI.

A. J. GROUT

Mosses New to the State.

AMBLYSTEGIUM ORTHOCLADON (P. B.) Kindb. Common in mountain streams in Windham Co., probably elsewhere.

ANOMODON VITICULOSUS MICROPHYLLUS Kindb. Ledges on mountain side, Newfane. Det. G. N. Best.

CAMPYLIUM POLYGAMUM (B. & S.) Bryhn, Swamp Newfane.

CALLIERGON GIGANTEUM (Schimp.) Kindb., Rutland, Kirk.

DICHELYMA PALLESCENS B. & S. On sticks in ditch running into Otter Creek, Rutland, Kirk.

DREPANOCLADUS KNEIFFII (B. & S.) Warnst. var. PUNGENS, H. Mueller. Near Mallets Bay, D. B. Griffin.

D. EXANNULATUS FALCIFOLIUS Ren. Lake of Clouds, Mt. Mansfield.

D. EXANNULATUS FALCIFOLIUS Ren. forma VIRIDIS Ren. Rutland, Kirk.